CLAIMS

1. A lighting fixture for producing a beam of light having a luminous flux spectrum emulating that of a beam of light produced by a predetermined light source having an incandescent lamp, such light source being free of a filter that modifies the luminous flux spectrum of the light emitted by the lamp, the lighting fixture comprising:

a plurality of groups of light-emitting devices, each such group configured to emit light having a distinct luminous flux spectrum; and

a controller configurable to supply selected amounts of electrical power to the plurality of groups of light-emitting devices, such that the groups cooperate to produce a composite beam of light having a prescribed luminous flux spectrum that has a normalized mean deviation across the visible spectrum of less than about 30% relative to the luminous flux spectrum of a beam of light produced by the predetermined light source to be emulated.

2. A lighting fixture as defined in claim 1, wherein the quantities of devices included in each of the plurality of groups of light-emitting devices are selected such that, if the controller supplies maximum electrical power to all of the groups, then the resulting composite beam of light will have a luminous flux spectrum having a normalized mean deviation across the visible spectrum of less than about 30% relative to the luminous flux spectrum of a beam of light produced by the predetermined light source to be emulated.

3. A lighting fixture as defined in claim 1, wherein the quantities of devices included in each of the plurality of groups of light-emitting devices are selected such that, if the controller supplies maximum electrical power to all of the groups, then the resulting composite beam of light will have a luminous flux spectrum having a normalized mean deviation across the visible spectrum of less than about 30% relative to the luminous flux spectrum of a theoretical beam of light produced by a predetermined light source having an incandescent lamp, as modified by a theoretical superposition of the spectral transmissions of a plurality of color filters.

4. A lighting fixture as defined in claim 1, wherein the controller further is configurable to supply selected amounts of electrical power to the plurality of groups of light-emitting devices, such that the groups cooperate to produce a composite beam of light having a prescribed luminous flux spectrum that has a normalized mean deviation across the visible spectrum of less than about 30% relative to the luminous flux spectrum of a beam of light produced by a predetermined light source that includes an incandescent lamp and a filter that modifies the luminous flux spectrum of the light emitted by such lamp.

5. A lighting fixture as defined in claim 1, wherein at least two of the plurality of groups of light-emitting devices include different quantifies of light-emitting devices.

6. A lighting fixture as defined in claim 1, wherein the plurality of groups of light-emitting devices include at least five groups of light-emitting devices, each such group being configured to emit light having a predetermined distinct luminous flux spectrum.

7. A lighting fixture as defined in claim 1, wherein the plurality of groups of light-emitting devices include at least eight groups of light-emitting devices, each such group being configured to emit light having a predetermined distinct luminous flux spectrum.

8. A lighting fixture as defined in claim 1, wherein each of the plurality of groups of light-emitting devices includes a plurality of light-emitting diodes.

9. A lighting fixture as defined in claim 1, wherein the plurality of groups of light-emitting devices together comprise an optical assembly that collects the emitted light and projects the composite beam of light from the fixture.

10. A lighting fixture as defined in claim 1, wherein the luminous flux spectrum of the composite beam of light has a normalized mean deviation across the visible spectrum of less than about 25% relative to the luminous flux spectrum of a beam of light

produced by the predetermined light source to be emulated.

11. A lighting fixture as defined in claim 1, wherein the luminous flux spectrum of the composite beam of light has a normalized mean deviation across the visible spectrum of less than about 20% relative to the luminous flux spectrum of a beam of light produced by the predetermined light source to be emulated.

12. A lighting fixture as defined in claim 1, wherein the luminous flux spectra of the beam of light produced by the lighting fixture and of the beam of light produced by the predetermined light source to be emulated are within 5 db of each other across the visible spectrum when the controller supplies prescribed maximum amounts of electrical power to all of the groups of light-emitting devices.

13. A lighting fixture as defined in claim 1, wherein the predetermined distinct luminous flux spectrum of the light emitted by each of the plurality of groups of light-emitting devices has a spectral half-width of less than about 40 nanometers.

14. A lighting fixture as defined in claim 1, wherein: the distinct luminous flux spectrum of the light emitted by each of the plurality of groups of light-emitting devices has a predetermined peak flux wavelength and a predetermined spectral half-width; the peak flux wavelength of each of the plurality of groups of light-emitting devices is spaced less than about 50 nanometers from the peak flux wavelength of another of the plurality of groups of light-emitting devices; and the spectral half-width of each of the plurality of groups of light-emitting devices is less than about 40 nanometers.

15. A lighting fixture for producing a beam of colored light having a prescribed luminous flux spectrum, the lighting fixture comprising:

a plurality of groups of light-emitting devices, each such group configured to emit light having a distinct luminous flux spectrum; and

a controller configurable to supply selected amounts of electrical power to the plurality of groups of light-emitting devices, such that the groups cooperate to produce a composite beam of light;

wherein the composite beam of light has a prescribed luminous flux spectrum having substantial energy only within a contiguous bandwidth of less than about 200 nanometers when the controller supplies prescribed maximum amounts of electrical power to all of the groups of light-emitting devices.

16. A lighting fixture as defined in claim 15, wherein:

each group of light-emitting devices is free of a filter that substantially changes the luminous flux spectrum of its emitted light; and

the controller is configurable to supply selected amounts of electrical power to the plurality of groups of light-emitting devices, such that the composite beam of light has a prescribed luminous flux spectrum emulating that of a predetermined light source having an incandescent lamp, such light source further having an associated filter that modifies the luminous flux spectrum of the light emitted by the lamp.

17. A lighting fixture as defined in claim 16, wherein the luminous flux spectrum of the composite beam of light has a normalized mean deviation across the visible spectrum of less than about 30% relative to the luminous flux spectrum of a beam of light produced by the predetermined light source to be emulated.

18. A lighting fixture as defined in claim 16, wherein the quantities of devices included in each of the plurality of groups of light-emitting devices are selected such that, if the controller supplies maximum electrical power to all of the groups, then the resulting composite beam of light will have a luminous flux spectrum having a normalized mean deviation across the visible spectrum of less than about 30% relative to the luminous flux spectrum of a theoretical beam of light produced by the predetermined light source, as modified by a theoretical superposition of the spectral transmissions of a plurality of color filters.

19. A lighting fixture as defined in claim 15, wherein the composite beam of light produced by the plurality of groups of light-emitting devices has a luminous flux spectrum having substantial energy only in wavelengths of less than about 600 nanometers when the controller supplies prescribed maximum amounts of electrical power to all of the groups of light-emitting devices.

20. A lighting fixture as defined in claim 15, wherein the composite beam of light produced by the plurality of groups of light-emitting devices has a luminous flux spectrum having substantial energy only in wavelengths of more than about 550 nanometers when the controller supplies prescribed maximum amounts of electrical power to all of the groups of light-emitting devices.

21. A lighting fixture as defined in claim 15, wherein at least two of the plurality of groups of light-emitting devices include different quantities of light-emitting devices.

22. A lighting fixture as defined in claim 15, wherein the plurality of groups of light-emitting devices include at least four groups of light-emitting devices, each such group being configured to emit light having a predetermined distinct luminous flux spectrum.

23. A lighting fixture as defined in claim 15, wherein each of the plurality of groups of light-emitting devices includes a plurality of light-emitting diodes.

24. A lighting fixture as defined in claim 15, wherein:

the distinct luminous flux spectrum of the light emitted by each of the plurality of groups of light-emitting devices has a predetermined peak flux wavelength and a predetermined spectral half-width;

the peak flux wavelength of each of the plurality of groups of light-emitting devices is spaced less than about 50 nanometers from the peak flux wavelength of another of the plurality of groups of light-emitting devices; and

the spectral half-width of each of the plurality of groups of light-emitting devices is less than about 40 nanometers.

25. A lighting fixture as defined in claim 15, wherein the composite beam of light has a luminous flux spectrum having substantial energy only within a contiguous bandwidth of less than about 150 nanometers.

26. A lighting fixture as defined in claim 15, wherein no portion of the contiguous flux spectrum of the composite beam of light has a flux intensity more than 5 db lower than flux intensities at wavelengths both above and below it.

27. A lighting fixture as defined in claim 15, wherein no portion of the contiguous flux spectrum of the composite beam of light has a flux intensity more than 2 db lower than flux intensities at wavelengths both above and below it.

28. A lighting fixture for producing a beam of light having a prescribed luminous flux spectrum, the lighting fixture comprising:

a plurality of groups of light-emitting devices, each such group configured to emit light having a distinct luminous flux spectrum, and at least two of the plurality of groups including different quantities of devices; and

a controller configurable to supply selected amounts of electrical power to the plurality of groups of light-emitting devices, such that the groups cooperate to produce a composite beam of light having a prescribed luminous flux spectrum.

29. A lighting fixture as defined in claim 28, wherein:

each of the plurality of groups of light-emitting devices is free of a filter that substantially changes the luminous flux spectrum of its emitted light;

the prescribed luminous flux spectrum is made to emulate that of a beam of light produced by a predetermined light source having an incandescent lamp, such light source being free of a filter that modifies the luminous flux spectrum of the light emitted by the lamp; and

the controller is configurable to supply selected amounts of electrical power to the plurality of groups of light-emitting devices, such that the composite beam of light has a

prescribed luminous flux spectrum that has a normalized mean deviation across the visible spectrum of less than about 30% relative to the luminous flux spectrum of a beam of light produced by the predetermined light source to be emulated.

30. A lighting fixture as defined in claim 29, wherein the quantities of devices included in each of the plurality of groups of light-emitting devices are selected such that, if the controller supplies maximum electrical power to all of the groups, then the resulting composite beam of light will have a luminous flux spectrum having a normalized mean deviation across the visible spectrum of less than about 30% relative to the luminous flux spectrum of a beam of light produced by the predetermined light source to be emulated.

31. A lighting fixture as defined in claim 29, wherein the luminous flux spectra of the beam of light produced by the lighting fixture and of the beam of light produced by the light source to be emulated are within 5 db of each other across the visible spectrum when the controller supplies prescribed maximum amounts of electrical power to all of the groups of light-emitting devices.

32. A lighting fixture as defined in claim 28, wherein:

each group of light-emitting devices is free of a filter that substantially changes the luminous flux spectrum of its emitted light;

the prescribed luminous flux spectrum is made to emulate that of a beam of light produced by a predetermined light source having an incandescent lamp, such light source further having an associated filter that modifies the luminous flux spectrum of the light emitted by the lamp; and

the controller is configurable to supply selected amounts of electrical power to at least two of the plurality of groups of light-emitting devices, such that the composite beam of light has a prescribed luminous flux spectrum that has a normalized mean deviation across the visible spectrum of less than about 30% relative to the luminous flux spectrum of a beam of light produced by the predetermined light source to be emulated.

33. A lighting fixture as defined in claim 28, wherein the plurality of groups of light-emitting devices include at least four groups of light-emitting devices, each such group being configured to emit light having a predetermined distinct luminous flux spectrum.

34. A lighting fixture as defined in claim 28, wherein each of the plurality of groups of light-emitting devices includes a plurality of light-emitting diodes.

35. A lighting fixture as defined in claim 28, wherein:

the distinct luminous flux spectrum of the light emitted by each of the plurality of groups of light-emitting devices has a predetermined peak flux wavelength and a predetermined spectral half-width;

the peak flux wavelength of each of the plurality of groups of light-emitting devices is spaced less than about 50 nanometers from the peak flux wavelength of another of the plurality of groups of light-emitting devices; and

the spectral half-width of each of the plurality of groups of light-emitting devices is less than about 40 nanometers.

36. A lighting fixture for producing a beam of light having a prescribed luminous flux spectrum, the lighting fixture comprising:

five or more groups of light-emitting devices, wherein each such group is configured to emit light having a distinct luminous flux spectrum; and

a controller configurable to supply selected amounts of electrical power to the five or more groups of light-emitting devices, such that the groups cooperate to produce a composite beam of light having a prescribed luminous flux spectrum.

37. A lighting fixture as defined in claim 36, wherein the five or groups of light-emitting devices include at least eight groups of light-emitting devices, each such group being configured to emit light having a predetermined distinct luminous flux spectrum.

38. A lighting fixture as defined in claim 36, wherein each of the five or more groups of light-emitting devices includes a plurality of light-emitting diodes.

39. A lighting fixture as defined in claim 36, wherein:

the distinct luminous flux spectrum of the light emitted by each of the five or more groups of light-emitting devices has a predetermined peak flux wavelength and a predetermined spectral half-width;

the peak flux wavelength of each of the plurality of groups of light-emitting devices is spaced less than about 50 nanometers from the peak flux wavelength of another of the plurality of groups of light-emitting devices; and

the spectral half-width of each of the plurality of groups of light-emitting devices is less than about 40 nanometers.

40. A lighting fixture as defined in claim 36, wherein the five or more groups of light-emitting devices cooperate to emit light spanning substantially the entire visible spectrum.

41. A lighting fixture for producing a beam of light having a prescribed luminous flux spectrum, the lighting fixture comprising:

three or more groups of light-emitting devices, each such group configured to emit light having a distinct luminous flux spectrum with a predetermined peak flux wavelength and a predetermined spectral half-width;

wherein the peak flux wavelength of each of the four or more groups of light-emitting devices is spaced less than about 50 nanometers from the peak flux wavelength of another of the groups of light-emitting devices; and

wherein the spectral half-width of each of the four or more groups of light-emitting devices is less than about 40 nanometers; and

a controller configurable to supply selected amounts of electrical power to the four or more groups of light-emitting devices, such that the groups cooperate to produce a composite beam of light having a prescribed luminous flux spectrum.

42. A lighting fixture as defined in claim 41, wherein the three or more groups of light-emitting devices include eight or more groups of light-emitting devices, each such

group configured to emit light having a distinct luminous flux spectrum with a predetermined peak flux wavelength and a predetermined spectral half-width.

43. A lighting fixture as defined in claim 41, wherein:

each of the plurality of groups of light-emitting devices is free of a filter that substantially changes the luminous flux spectrum of its emitted light;

the prescribed luminous flux spectrum is made to emulate that of a beam of light produced by a predetermined light source having an incandescent lamp, such light source being free of a filter that modifies the luminous flux spectrum of the light emitted by the lamp; and

the controller is configurable to supply selected amounts of electrical power to the plurality of groups of light-emitting devices, such that the composite beam of light has a prescribed luminous flux spectrum that has a normalized mean deviation across the visible spectrum of less than about 30% relative to the luminous flux spectrum of a beam of light produced by the predetermined light source to be emulated.